1.0 INDEX 目录

2.0 PURPOSE 目的

The specification sheet is designed to build up and improve Wanxiang A123 Systems Asia Co., Ltd technical documentation so as to instruct production and product shipment and consequently guarantee product quality. At the same time, it is convenient for to confirm product specifications with customers and finally reach an agreement.

为建立健全的公司技术资料，确保产品质量，用于指导产品生产、出货。方便与客户确认产品规格，并达成一致，制定本产品规格书。

3.0 SCOPE 适用范围

This product specification describes the type, size, structure, electrochemistry performance, safety, characteristics, warning and cautions of the cell. This specification only applies to the WX12I3752 cell that supplied by Wanxiang A123 Systems Asia Co., Ltd.

本产品规格书规定了 WX12I3752 电芯的类型、尺寸、结构、电化学性能、安全性能及注意事项，本标准仅适用于万向一二三股份公司生产的 WX12I3752 电芯。

4.0 BATTERY DESCRIPTION 电池描述

Model: WX12I3752

型号：WX12I3752

Cell Description: Energy rechargeable Lithium-ion Battery

电池类型：能量型可充电锂离子电池

5.0 BATTERY SPECIFICATION 电池规格

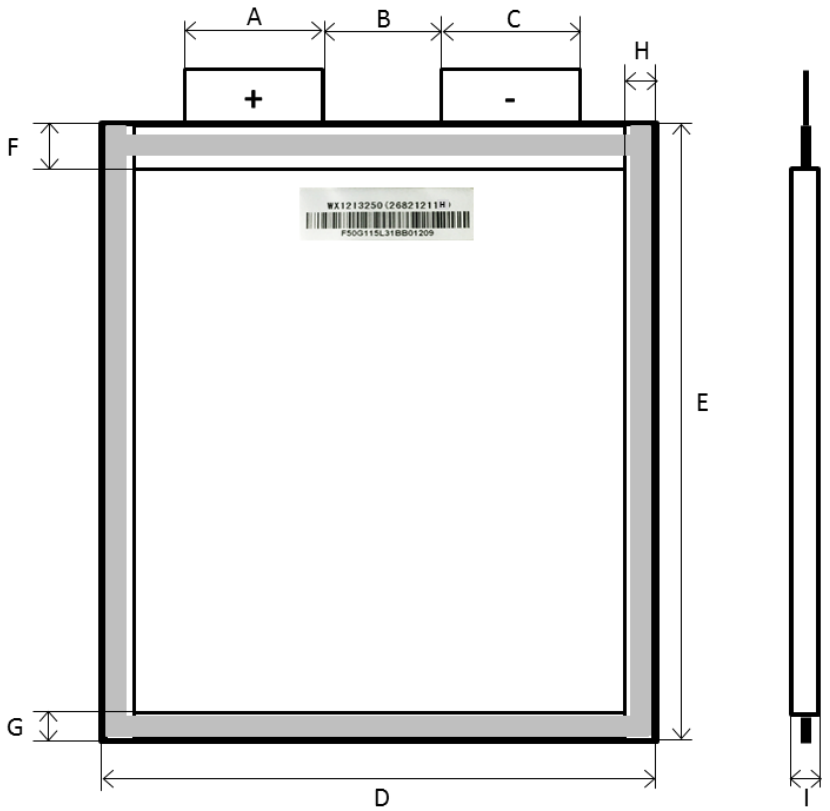
Item 项目	Specification 标准
Nominal capacity 标称容量	52.0Ah
Minimum capacity 最小容量	52.0Ah
Charge cut-off voltage 充电截止电压	4.2V
Nominal voltage 标称电压	3.7V
Charging method 充电方式	CC-CV (first constant current then constant voltage) 恒流恒压充电（先恒流，后恒压）
Normal charge time 标准充电时间	2 hours 2 小时
Maximum continuous charge current 最大持续充电电流	104.0A (2.0C)
Maximum continuous discharge current 最大持续放电电流	156.0A (3.0C)
Maximum Pulse Charge Current 最大脉冲充电电流	156.0A (3.0C)
Maximum Pulse Discharge Current 最大脉冲放电电流	260.0A (5.0C)
Discharge Cut-off Voltage 放电截止电压	2.7V
Cell Weight 电池重量	0.895±0.015 kg
Cell Dimension 电池尺寸	Thickness: 7.25±0.2mm (30% SOC, 10 Psi) 厚度：7.25±0.2mm (30% SOC, 10 Psi) Width: 240±2.0 mm (no folding) 宽度：240±2.0 mm（未折边） Width: 228±2.0 mm (folding) 宽度：228±2.0 mm（折边） Height: 268±2.0 mm 高度：268±2.0 mm
Operating Temperature 使用温度	Charge: -10 ~55℃（The current limit should following technical agreement） 充电：-10 ~ 55℃（电流限制参考技术协议） Discharge: -20 ~ 55℃ 放电：-20 ~ 55℃

Storage Temperature 存储温度	≥1 year: -40～25℃ ≥1年：-40～25℃ 3 months: -40～35℃ 3个月：-40～35℃ 1 month: -40～45℃ 1个月：-40～45℃ 7days: -40～55℃ 7天：-40～55℃

Note: Wanxiang A123 Systems Asia Co., Ltd strongly suggests the cells should be stored where it is cool, no light and away from heat sources and hazardous chemical. We also advise the cells should have 30%~50% of SOC. If possible, please charge the cells every three months. With proper storage and maintenance, the cells' life can be prolonged.

备注：万向一二三股份公司强烈建议电池存储在低温环境，避免光照，远离热源和危险化学品。电池必须在 30% ～ 50% SOC 状态下存储。如果条件允许，长期存储请每三个月维护一次（≤1C 条件进行充放电一次）。适当的存储和维护方法，可以延长电池的寿命。

6.0 APPEARANCE AND DIMENSION 电芯外观尺寸



Appearance and Dimension of WX12I3752 (no folding)

WX12I3752 电芯的外观尺寸图（未折边）

Code 编号	A	B	C	D	E	F	G	H	I
Dimension 尺寸 mm	60.0±0.2	51±1	60.0±0.2	240±2	268±2	19.0±0.5	11.0±0.5	12.5±1.0	7.25±0.2

7.0 STANDARD TEST CONDITIONS 标准测试环境

Standard environmental conditions: Unless otherwise specified, all tests stated in this specification are conducted at temperature 25±5℃, humidity 15%-90% and air pressure between 86kPa to 106kPa. RT means 25℃±2℃.

测试环境：除另作说明，所有的测试的标准测试环境是：温度25±5℃，湿度15-90%，大气压86kPa~106kPa。室温代表25℃±2℃。

8.0 PERFORMANCES AND TEST METHOD 电池性能及测试方法

Explanation of terminology 术语解释

Standard Charge：Charge the cell with constant rate 1.0C to 4.2V then constant voltage until charge current to 0.05C;

标准充电方法：电池以1.0 C的电流恒流充电至4.2V，然后以4.2V的电压恒压充电，直到充电电流减少到0.05C停止充电。

Standard Discharge：Discharge the cell with constant rate 1.0 C to 2.7V.

标准放电方法：电池以1.0 C的电流恒流放电至2.7V停止。

Explosion：Battery ruptured accompanied by loud noise, and ingredient (solids) spraying out.

爆炸：电池外壳猛烈破裂，伴随剧烈响声，且有主要成分（固体物质）抛射出来。

Fire: Any part of the battery continues to fire (continues longer than 1s). Spark and arc does not belong to fire

起火：电池任何部位发生持续燃烧（持续时间长于1秒）。火花及拉弧不属于燃烧。

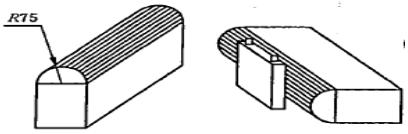
Leakage: The internal liquid of battery leaked to the outside.

漏液：电池内部液体泄漏到电池壳体外部。

9.0 ELECTRICAL PERFORMANCE 电性能参数

No 序号	Item 项目	Criteria 标准	Test Method and Condition 测试方法和环境
1	RT Capacity 室温容量	Capacity ≥ 52Ah 容量 ≥ 52Ah	The cell performs 0.5C charge and 0.5C discharge at RT, calculate the discharge capacity. 室温下，电池按 0.5C 充电和 0.5C 放电,测量放电容量。
2	AC impedance 交流内阻	≤ 1.0mΩ	AC impedance of the cell is measured at 1KHz after standard charging. 标准充电后，在 1KHz 的频率下测试
3	Rate charge （RT） 室温倍率充电	DC Capacity ≥ 80% 放电容量 ≥ 80%	After standard discharging, charging at RT with the 2C currents at the cut off voltage of 4.2V, then measure the discharge capacity at 1C current 标准放电后，室温下以 2C 的电流恒流充电到 4.2V，然后测试 1C 放电容量。
4	Rate Discharge （RT） 室温倍率放电	1.0C = 100% 2.0C ≥ 95% 3.0 ≥ 90%	After standard charging, discharge capacity is measured at RT with the various currents (0.5C,1C,2C,3C)at the cut off voltage of 2.7V. 标准充电后，室温下以不同的电流(0.5C,1C,2C,3C)放电到 2.7V，测试放电容量。
5	Discharge at high & low temperature 高低温放电	55℃ ≥ 95% 25℃ = 100% 0℃ ≥ 80% -20℃ ≥ 70% (-20℃放电截止电压 2.0V)	After standard charging, the cell is stored in different temperature (25℃，-20℃，0℃，55℃) for 3 hours, then test the cell capacity separately in each temperature with standard discharge method. (-20℃ cut off at 2.0V) 按标准充电方法充满电的电池在不同的温度下(25℃，-20℃，0℃，55℃)搁置 6 小时，然后用标准放电方法(-20℃放电到 2.0V)测试每个温度下电池的容量。
6	Storage at RT 室温存储	Remaining capacity ≥ 90%; Capacity recovery ≥ 90% 剩余容量 ≥ 90% 恢复容量 ≥ 90%	After standard charging, the cell stored at 25±2℃ for 28days, then measured the remaining capacity and capacity recovery by standard discharge method. 按标准充电方法充满电的电池在 25±2℃的环境下放置 28 天后，以标准放电方法测量剩余和恢复容量。
7	Storage at 55℃ 高温存储	Remaining capacity ≥ 90%; Capacity recovery ≥ 90% 剩余容量 ≥ 90% 恢复容量 ≥ 90%	After standard charging, the cell stored at 55±2℃ for 7 days, then the cell stored at RT for 5h, measured the remaining capacity and capacity recovery by standard discharge method. 按标准充电方法充满电的电池在 55±2℃的环境下放置 7 天后，在室温环境中放置 5 小时，然后以标准放电方法测量剩余和恢复容量。
8	1C/1C Cycle Life（RT） 室温1C/1C循环寿命	After 2000 cycles remaining capacity ≥ 80% 容量剩余 ≥80%	The cell performs 1C/1C cycle @ 25℃ for 2000 times, and between charge and discharge the cell should rest at least 10 min, and then test the remaining capacity. 电池在 25℃温度下进行 1C/1C 的充电，放电循环 2000 次，测量剩余容量。充电放电间间隔至少 10 分钟。

10.0 SAFETY PERFORMANCES 安全性能

No. 序号	Item 项目	Criteria 标准	Test Method and Condition 测试方法和环境
1	Nail Test 针刺测试	No explosion, no fire. 不爆炸，不起火	After standard charging, the cell is impaled vertically through the center by a nail (diameter: 5~8mm) at the speed of 25±5mm/s (the nail kept inside), then observed for 1h 按标准方法充电的电池，用 5mm~8mm 直径的耐高温钢针，以 25±5mm/s 的速度,从垂直于电芯的方向贯穿电池单体。（针不拔出），观察 1 小时。
2	Crush Test 挤压测试	No explosion, no fire. 不爆炸，不起火	 After standard charging, With a radius of 75 mm semi-cylinder perpendicular to the direction of the battery plate extrusion at a speed of 5±1 mm/s (Ref fig). Battery reaches 0 V or more than 30% deformation or pressure reaches 200 KN stop pressing. 标准方法充电的电池，用半径为 75mm 的半圆柱体垂直于电池极板方向以 5±1mm/s 的速度挤压电池（如图）。电池达到 0V 或者变形量超过 30%或者挤压力达到 200KN 时停止挤压。
3	Heating Test 加热测试	No explosion, no fire. 不爆炸，不起火	After standard charging, heating the cell to 130℃ ±2℃ from the RT at the 5℃/min heating rate and holding for 30min，then observed for 1h 按标准方法充电，将电池以 5℃/min 的加热速率从室温加热到 130℃ ±2℃，并维持 30 分钟，观察 1 小时。
4	Short-Circuit Test 短路测试	No explosion, no fire. 不爆炸，不起火	After standard charging, the battery is to be short-circuited for 10min by connecting the cathode and anode tab ,the connecting resistance should be less than 5mΩ, then observed for 1h 按标准方法充电，然后用电阻小于 5mΩ 的铜线连接电池的正负极持续 10 分钟,观察 1 小时。
5	Overcharge Test 过充电测试	No explosion, no fire. 不爆炸，不起火	After standard charging, the battery shall be charged with constant current 1C, stop charging while the voltage reached 5.475V or charging time reach 1h 按标准方法将电池充满电，然后按以下方式充电： 用 1C 的电流充电，直到电池电压达到 6.3V，或者充电时间达到 1 小时。
6	Over-discharge Test 过放电测试	No explosion, no fire, no leakage 不爆炸，不起火，不漏液	After standard charging, the battery shall be discharged for 90min, observed for 1h. 按标准方法将电池充满电，然后用 1C 的电流将电池放电 90min,观察 1 小时。

<table>
<tr><td>7</td><td>Drop test
跌落测试</td><td>No explosion, no fire, no leakage
不爆炸，不起火，不漏液</td><td>After standard charging, the battery tab face to the ground and dropped from 1.5m height to the concrete ground, observed for 1h.
按标准方法将电池充满电，电池正负极耳朝下从 1.5 米的高度跌落到水泥地板上，观察 1 小时。</td></tr>
<tr><td>8</td><td>Seawater dipping test
海水浸泡测试</td><td>No explosion, no fire.
不爆炸，不起火</td><td>After standard charge, the battery fully dipped into the 3.5% NaCl
solution for 2h.
按标准方法将电池充满电，将电池完全浸没到 3.5% 浓度的 NaCl 溶液中 2 小时。</td></tr>
<tr><td>9</td><td>温度循环测试
Temp cycle test</td><td>No explosion, no fire, no leakage
不爆炸，不起火，不漏液</td><td>After standard charge, the battery take into the temperature test chamber and change the chamber temp as the table below, and cycled for 5 times, then observed for 1h.
按标准方法将电池充满电，将电池放入温度箱按下表进行调节，并循环 5 次。观察 1 小时。
<table>
<tr><th>温度 ℃
Temp</th><th>时间 min
Time</th><th>累计时间 min
Cumulative time</th><th>温度变化率 ℃/min
Temp. change rate</th></tr>
<tr><td>25</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>-40</td><td>60</td><td>60</td><td>13/12</td></tr>
<tr><td>-40</td><td>90</td><td>150</td><td>0</td></tr>
<tr><td>25</td><td>60</td><td>210</td><td>13/12</td></tr>
<tr><td>85</td><td>90</td><td>300</td><td>2/3</td></tr>
<tr><td>85</td><td>110</td><td>410</td><td>0</td></tr>
<tr><td>25</td><td>70</td><td>480</td><td>6/7</td></tr>
</table></td></tr>
<tr><td>10</td><td>低气压测试
Low pressure test</td><td>No explosion, no fire, no leakage
不爆炸，不起火，不漏液</td><td>After standard charge, Put the battery into the low pressure chamber and set the pressure as 11.6KPa, remained for 6h, observed for 1h.
按标准方法将电池充满电，在室温下将电池放入的低气压箱，设置气压为 11.6KPa。持续 6 小时，然后再观察 1 小时。</td></tr>
</table>

11.0 SHIPMENT 运输

Cells should be shipped at about 30~ 50% of SOC.

电池应该在30~50%的荷电状态下运输。

12.0 WARNING AND CAUTIONS 警告及注意事项

Cells must be applied in strict accordance with the specification of Wanxiang A123 Systems Asia Co., Ltd. Abuse of a battery may cause the battery to get heat, ignite, or explode and cause serious injury. Wanxiang A123 Systems Asia Co., Ltd has no legal liability on any overheat, fire, explosion or other situations when the cells are used not according to the specifications. Be sure to abide by the safety rules as following

消费者必须严格按照万向一二三股份公司的规格书要求使用电池，避免充放电方法或储存维护不当而

影响电池使用寿命和安全性。由于误用会引起电池过热，发生火灾，或爆炸以及其他没有按照规格书进行操作所造成的任何意外事故，万向一二三股份公司不负任何责任。请严格遵守以下安全条款：

- **Do not disassemble cells; Do not put cells in water or fire;**
  不要拆解电池，不要把电池放到火中或者水中。
- **Please charge the cells with specified charger and follow the specifications. The cells can only be used in the specified equipment. It's not allowed for other applications.**
  请用指定充电器按标准充电。电池只能在指定设备上使用，不要在其他设备上使用。
- **If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during usage, recharging or storage, immediately remove it from the device or battery charger and stop using it.**
  如果电池发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电池从装置或充电器中移开并停用。
- **Battery cell operating temperature shall be maintained below 40℃ for most of the time to keep a good battery life. The operating hours over 45℃ shall be limited within 100hrs/year.**
  正常使用时电池的绝大部分工作温度应保持在 **40**℃以下，以保持电池良好的寿命。超过 **45**℃的使用时间一年累积不能超过 **100** 小时。
- **Cell can't be placed or used near fire or where it is over 60℃ or stored in such area.**
  电池不能在靠近火源或者超过**60**℃的环境中使用、放置和存储。
- **Do not connect the positive (+) and negative (-) terminals with a metal object; Do not put the cells together with necklace, hairpin, coins or screws or other metal.**
  不要使用金属导体短路电池的正负极；也不要把电池同项链、发夹、硬币或镙钉等金属品一起放在兜里或包中，也不要把电池同上述物品一起储存。
- **Please be careful and not damage the cells with sharp objects.**
  不要使用锐利的物品刺穿电池。
- **Please read the operation manual carefully. Any improper operation may lead to overheat, fire, explosion, damage or loss of capacity.**
  请仔细阅读操作说明书，任何不恰当的操作可能导致过热、着火、爆炸、电池损伤或者容量衰减。

REVISION HISTORY

Rev	Effective Date	Rev Author	Description of Revision	
01			Initial Release	
Reason for Revision:				**EC:**